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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/685,088	10/10/2003	Minoru Taniyama	693.008	5501

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EXAMINER

CONNELLY CUSHWA, MICHELLE R

ART UNIT

PAPER NUMBER

2874

DATE MAILED: 03/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/685,088

Applicant(s)

TANIYAMA ET AL.

Examiner

Michelle R. Connelly-Cushwa

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 1203.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

The prior art documents submitted by applicant in the Information Disclosure Statement filed on December 15, 2003 have all been considered and made of record (note the attached copy of form PTO-1449).

Drawings

Four (4) sheets of formal drawings were filed on October 10, 2003 and have been accepted by the Examiner.

Specification

The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 1; the claim recites "a distance between the rod lens and the optical element is longer than a predetermined distance" in lines 11-12 of claim 1. This is unclear because the predetermined distance is the distance between the rod lens and the optical element in the present invention (see page 1, lines 21-23; page 5, lines 15-17; and page 12, lines 25-27 of the present application). It is not clear how the distance between the rod lens and the optical element can be longer than the predetermined distance, when the predetermined distance, as used in the specification, is the distance between the rod lens and the optical element.

Regarding claim 5; the claim recites "the predetermined value" in lines 1-2 of the claim. This limitation lacks antecedent basis.

Regarding claim 9; the claim recites the limitation "the optical fiber" in lines 7-8 of the claim. This limitation is unclear because claim 9 also recites "first and second optical fibers" in line 3 of the claim. It is impossible to tell whether the optical fiber later referred to is the first optical fiber or the second optical fiber.

Regarding claims 2-8 and 10-13; the claims inherently contain the deficiencies of the base and intervening claim from which they depend.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States

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only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 3-5, 7, 9, 11 and 12 are rejected under 35 U.S.C. 102(e) as being anticipated by Fukuzawa et al. (US 2003/0026540 A1).

Regarding claim 1; Figures 4 and 5 of Fukuzawa et al. disclose an optical module comprising:

- at least one optical fiber (15, 16 and 17 in Figure 4; 11, 12 and 13 in Figure 5) each having an end surface and being arranged parallel to each other;
- a gradient index rod lens (21; see Figure 5 and paragraph [0069]), wherein the rod lens (21) is placed at a position separated from the end surfaces of the optical fibers by a space; and
- an optical element (50) that is separated from the rod lens (21);
- wherein outgoing light (λ_1 , λ_2) from at least one optical fiber (11, 13) is inputted to the optical element (50) via the rod lens (21), and light (λ_1) reflected by the optical element (50) is coupled to the at least one optical fiber (11, 13) via the rod lens (21);
- wherein a distance (f) between the rod lens and the optical element is longer than a predetermined distance;
- wherein a lens length optimized for the distance is equal to or less than a predetermined pitch (see paragraph [0070]-[0071]); and
- wherein the rod lens has end surface perpendicular to an optical axis.

Regarding claims 3 and 11; the optimized lens length of the rod lens is between 0.21 pitch and 0.1 pitch inclusive (see paragraphs [0071]-[0073] and the lens length section of Figure 17).

Regarding claims 4 and 12; the refractive index of gradient-index lenses (gradient index rod lenses) varies parabolically as a function of radius, and it is an inherent property of a gradient index rod lens that the working distance (back focal length) is given by:

$$L_o = \frac{1}{n_0 \sqrt{A} \tan(z\sqrt{A})}$$

(see pages 15.16-15.17 of "The Practical Application of Light", Melles Griot, 1999).

Fukuzawa et al. further discloses that the optical device (50) is arranged at a predetermined position that is set within + or - .25% of the focal length of the lens (21), and thus the distance between the rod lens and the optical element may be shorter than the calculation value (see paragraph [0043]).

Regarding claim 5; the value that the optical element (filter, 50) may be displaced from the gradient index rod lens (21) is about 0.3 mm (see in Figure 17 the first row titled "Displacement of the filter form the focal position").

Regarding claim 7; the at least one optical fiber comprises:

- an incoming optical fiber (11) and an outgoing optical fiber (13);
- wherein the incoming optical fiber causes light to reach the rod lens (21) from a part displaced from the optical axis; and

- wherein the outgoing optical fiber is located at a position to which light that is reflected by the optical element (50) and passes through the rod lens is coupled.

Regarding claim 9; Figure 12 of Fukuzawa et al. discloses an optical module using a gradient index rod lens (532, 533) comprising:

- first and second optical fibers (535, 536) each having an end surface and being arranged parallel to each other;
- a gradient index rod lens (535, 536; see paragraph [0149]), wherein the rod lens is placed at a position separated from the end surfaces of the optical fibers by a space; and
- an optical element (534) that is separated from the rod lens;
- wherein outgoing light from the first optical fiber is inputted to the optical element via the rod lens, and light reflected by the optical element is coupled to the second optical fiber via the rod lens;
- wherein the end surfaces of the optical fiber are inclined relative to a plane perpendicular to the optical axis of the rod lens by a predetermined angle;
- wherein a distance between the rod lens and the optical element is longer than a predetermined value;
- wherein a lens length optimized for the distance is equal to or less than a predetermined pitch (see paragraph [0070]-[0071]); and
- wherein the rod lens has end surface perpendicular to an optical axis.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2, 8, 10 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukuzawa et al. (US 2003/0026540 A1).

Regarding claims 2 and 10; Fukuzawa et al. discloses all of the limitations of these claims as applied above, except for specifically stating that the value of the distance is about 0.4 mm. Fukuzawa et al. teaches that the distance the lens length is optimized for is the focal distance, which is based on the lens length, and that the lens length is based on pitch, which is based on refractive index distribution (see paragraph [0070]) for a gradient index rod lens. Therefore, one of ordinary skill in the art would have recognized that the distance could be any desired value, including 0.4 mm, since the length of the lens, the pitch and/or the refractive index distribution can be selectively chosen to adjust the distance, wherein the distance is the focal distance of the gradient index rod lens. Therefore, one of ordinary skill in the art would have found it obvious to have the distance or focal distance of the lens be any desired value, including 0.4 mm, since it has been held that wherein the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (*In re Aller*, 105 USPQ 233) and that discovering an optimum value of a result

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effective variable involves only routing skill in the art (*In re Boesch*, 617 F. 2d 272, 205 USPQ 215 (CCPA 1980)).

Regarding claim 8; the at least one optical fiber comprises:

- an incoming optical fiber (11) that is located at an incoming side of the rod lens (21) and another optical fiber (13) located at a position to which light that is reflected by the optical element (50) is coupled via the rod lens (21);
- wherein the two optical fibers are held in parallel by a capillary (see paragraphs [0072]-[0074]);
- wherein the end surfaces of the optical fibers are arranged to be spaced from the end surface of the rod lens by an equal distance; and
- wherein optical axes of the two optical fibers are substantially parallel to the optical axis of the rod lens.

Regarding claim 13; Fukuzawa et al. discloses all of the limitations of claim 13 as applied above, except for the first and second optical fibers being arranged to contact each other on the optical axis of the rod lens. One of ordinary skill in the art would have found it obvious to position the optical fibers as closely together as necessary to ensure that the reflected light is accurately coupled, including positioning the optical fibers so that they contact each other along the optical axis of the rod lens, especially since dual fiber collimators are commonly formed in this manner in the art, and since it appears that the invention would perform equally well regardless.

Allowable Subject Matter

Claim 6 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The prior art cited on attached form PTO-892 is the most relevant prior art known, however, the invention of claim 6 distinguishes over the prior art of record because none of the references either alone or in combination disclose or render obvious an optical module as defined in claim 6, wherein the at least one optical fiber is a single optical fiber located coaxially with the rod lens and an optical circulator is connected to the incoming optical fiber in combination with the other limitations of claim 6.

Hence, there is no reason or motivation for one of ordinary skill in the art to use the prior art of record to make the invention of claim 6.

Conclusion

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

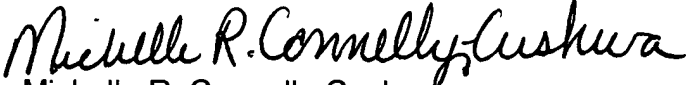
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The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Takahashi (US 5,588,081); Hopler et al. (US 5,680,492); Cheng (US 6,157,485); Gardner et al. (US 6,839,485 B2); Ooyama et al. (US 6,785,441 B2); Ludington et al. (US 6,744,566 B2); Chang (US 6,625,352 B2); Shi et al. (US 6,584,271 B2); Kittaka et al. (US 2003/0076598 A1); Jang et al. (US 2002/0181865 A1); Huang et al. (US 2002/0181824 A1); Huang et al. (US 2003/0063853 A1); Shi et al. (US 2003/0091318 A1); and Gardner et al. (US 2004/0017969 A1) each disclose optical modules comprising optical fibers, gradient index lenses and optical elements.

Any inquiry concerning the merits of this communication should be directed to Examiner Michelle R. Connelly-Cushwa at telephone number (571) 272-2345. The examiner can normally be reached 9:00 AM to 7:00 PM, Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney B. Bovernick can be reached on (571) 272-2344. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general or clerical nature should be directed to the Technology Center 2800 receptionist at telephone number (571) 272-1562.


Michelle R. Connelly-Cushwa
Patent Examiner
March 10, 2005